

DRAFT WORK PLAN FOR LAKE ONE CHARACTERIZATION STUDY DP-1340 CHINO MINES COMPANY

1.0 OBJECTIVES

The purpose of this Work Plan is to outline the general approach for the characterization study of the Lake One Area, as required under the Proposed Supplemental Discharge Permit for Closure DP-1340, Chino Mines Company, dated December 21, 2001. The Work Plan herein addresses Condition #90.

The specific language of Condition #90 is as follows:

Chino shall perform a Lake One Area characterization study. Within one year after the Effective Date of this Supplemental Discharge Permit, Chino shall submit to NMED for approval a report that addresses characterization of the sediments and ground water in the Lake One Area, a detailed analysis of closure alternatives for the Lake One Area, and a selection of one alternative as the proposed plan including an implementation schedule. The Lake One characterization study shall include, an evaluation of the extent and magnitude of ground water and sediment contamination, and an evaluation of the connection between shallow and regional ground water. The analysis of closure alternatives shall evaluate how the proposed closure plan will ensure that the requirements of the WQA and the WQCC Regulations are met. At a minimum, the analysis of closure alternatives shall include 1) excavation of all contaminated sediments above and below the water table and reprocessing or disposal of the sediments in a location approved by NMED; 2) the interim closure plan required by Condition 23 that includes cover, ground water pumping and water treatment; and 3) other closure alternatives. Upon NMED approval of an alternative, Chino shall commence implementation of the Lake One Area closure plan according to the implementation schedule approved by NMED.

In order to comply with the above Condition, a phased approach consisting of the following steps is proposed:

- Phase I- Data Compilation/Review
- Phase II- Field Data Collection
- Phase III Alternatives Evaluation
- Phase IV Feasibility Study

The proposed general scope of work is presented in Section 2 below, and the proposed schedule is presented in Section 3. Chino is currently removing and leaching Lake One material in order to recover copper. This characterization study will investigate only the Lake One material not reprocessed but will consider the effect of reprocessing on

achieving the objectives in Condition #90. Characterization of the Lake One material removed for reprocessing is being characterized pursuant to DP-526 requirements.

2.0 SCOPE OF WORK

1. PHASE I - DATA COMPILATION AND REVIEW INTRODUCTORY PARAGRAPH

Phase I will consist of the following tasks:

A. Defining the study area

- Review available historic aerial photographs to assess potential area of impact. Photo-mosaics have been recently developed for the years 1935, 1955/59, 1974, and 1996.

B. Compiling and summarizing existing data

- Summarize previous relevant investigations and data collection programs
 - DBS&S, 1996, Existing Data Report and Tailing Characterization
 - Golder, 1999 Comprehensive Groundwater Characterization Study
 - URS, 1999, Final Design Report, Upper Whitewater Creek Diversion Project
 - Chino, 1995, Chino AOC Background Report
 - DBS&A, 1998, Chino AOC Well Use Survey
 - Golder, 2000, Phase 1 Remedial Investigation, Hanover/Whitewater Creeks Investigation Units
 - Relevant internal Chino Lake One characterization information
 - Other DP and/or NPDES information
 - Hurley monitoring wells
 - Bedrock permeability testing for smelter storm water ponds
 - Smelter storm water and process water systems
- Historic topographic information (e.g., channel location, floodplain extent, valley sides)
- Groundwater information
 - Tabulate Chino monitor well construction information
 - Tabulate non-Chino monitor well construction information
 - Tabulate other well construction information (within 2-mile radius)
 - Summarize availability of water quality data from each available source and period of record (i.e. wells)
- Surface water information
 - Tabulate available surface water data (stations, period of record etc.)
 - Identify contributing watersheds and existing controls
- Lake One material information
 - Geometry and approximate volumes
 - Geochemical characteristics
 - Physical characteristics
- Underlying geologic materials (adjacent to Lake One materials)
 - Types, locations, and thicknesses

- Factors related to attenuation
- Summarize existing monitoring programs and quality assurance plans

C. Assess quality of available data

- Evaluate data quality and determine appropriate use
 - Groundwater quality
 - Geology/stratigraphy
 - Groundwater levels/gradient
 - Hydrologic properties
 - Surface water quality
 - Surface water flow frequency/duration
 - Lake One material characteristics and volumes

D. Develop conceptual model

- Geology (formations and spatial configurations)
- Surface water hydrology (quality and frequency/duration)
- Hydrogeology (hydraulic properties, rates and directions of flow, recharge and discharge locations/relationships)
- Groundwater quality (constituent concentrations and spatial configurations, any trends, assessment of possible sources)
- Surface water/groundwater interactions (changes in groundwater levels/quality with respect to floods)
- Lake One material characterization (volumes and zoning, geochemical characteristics, configuration with respect to water table and groundwater recharge/discharge points)
- Underlying geologic materials characterization (types, locations, thicknesses, neutralization capacity)

E. Identify data gaps

- Geology/stratigraphy
- Lake One materials
- Underlying geologic materials
- Groundwater
- Surface water

F. Report and Phase II Work Plan

Phase I Submittals

- Phase I report and proposed Phase II field data collection program (single document)
 - Summary of existing information, quality, and appropriate uses
 - Conceptual model based on existing data
 - Data gaps
- Phase II Scope of Work for field activities

- Data collection plan
- Quality assurance plan
- Health and Safety plan
- Schedule

2. Phase II - FIELD DATA COLLECTION PROGRAM

- **Geologic characterization**
 - Bedrock contacts
 - Stratigraphy and structure
- **Lake One materials and underlying geologic materials characterization**
 - Physical characteristics (e.g., volumes, thicknesses, zones)
 - Geochemical characteristics (e.g., total metals, acid-base accounting, leachable metals, mineralogy, neutralizing capacity) of material that's not scheduled to be reprocessed
- **Groundwater characterization**
 - Water table configuration and presence/absence of perched zones
 - Hydraulic characteristics of saturated sediments
 - Geometry of saturated sediments
 - Hydraulic gradients, directions of flow, and site water balance
 - Water quality and plume configuration

The Phase II scope of work is currently anticipated to include drilling and installing between 5 and 10 additional monitor wells sited strategically to (1) define the geometry of the Lake One materials and underlying geologic materials, as well as the surrounding geologic formations, (2) evaluate discharge/recharge points, surface water/groundwater interactions, and shallow/deep groundwater connections. In addition, it is possible that auger and/or geoprobe boreholes will be used to sample source and underlying geologic materials without completion as monitor wells. Following well completion and development, short-term pumping and/or slug tests will be conducted as appropriate. Initial sampling and analysis will likely consist of:

- Field parameters, such as water pH, paste pH, specific conductance
- Source and underlying geologic material with analysis of total metals, and a subset of the samples analyzed for acid-base accounting, leachable metals, and mineralogy
- Groundwater samples with analysis of constituents and parameters on the DP list.

The groundwater monitoring wells will be resampled once after installation (e.g., one month after initial sampling) in order to allow groundwater conditions to stabilize and confirm the initial results.

Phase II Submittals

The field work undertaken in Phase II will be documented in the Phase III submittals.

3. Phase III -ALTERNATIVES EVALUATION

Alternatives evaluation will consist of developing alternatives, estimating quantities and costs involved, and comparing alternatives. Alternative development will proceed by identifying components (or sub-alternatives), which might include:

- Isolation alternatives
 - Capping
 - Cutoff walls
 - No action
 - Removal alternatives
 - Trucking
 - Slurry
 - Conveyor
 - No action
 - Reprocessing or Disposal alternatives
 - Current reprocessing project
 - Alternative reprocessing project
 - Treatment
 - Disposal on tailing impoundments (with or without reprocessing or treatment components)
 - No action
 - Groundwater alternatives
 - Natural attenuation
 - Recharge control (e.g., cutoff wall)
 - Discharge control (e.g., pump and treat)
 - Reclamation alternatives
 - Post-removal use of "hole" (for removal alternatives only)
 - Reclamation of capped or post-removal surfaces
 - Runon/runoff controls
- Some of the above components are mutually exclusive; others are compatible. Furthermore, all components could be applied to part or all of the Lake One materials volume. The components will be "mixed and matched" as part of technology screening to craft a limited set of the most practical alternatives.

Alternatives will be developed to a conceptual level for comparison. Quantities and approximate costs (e.g., $\pm 30\%$) will be estimated for the selected alternatives. Initial (e.g., construction, capital) costs and long-term costs (e.g., monitoring, operation and maintenance) will be considered using methods similar to those as previously used in the Chino Closure/Closeout Plan. The alternatives will then be compared with respect to costs, qualitative advantages and disadvantages, implementation schedule/duration, and

effectiveness with regard to meeting NMWQCC standards, as well as other criteria as appropriate.

Phase IV Feasibility Study

> Phase IV report

- Compilation of all previously existing and newly acquired data
- Complete documentation of all data collection activities and results
- Updated conceptual model
- Alternatives development
- Alternatives evaluation
- Proposed preferred alternative, rationale, and proposed implementation schedule

All relevant information and analysis for all phases of the work will be contained in the final report.

3.0 SCHEDULE AND SUBMITTALS

Although DP-1340 has not yet been issued, Chino plans to conduct this project in approximately one year. Several meetings or conference calls will be held as the project advances, with possible times being scheduled to discuss work plan(s) for field activities, preliminary field results, and alternative development. Given the one-year requirement, Chino will have to proceed with field work in a timely fashion after submitting the Phase I Report/Work Plan. The resulting approximate schedule is shown below.

PHASE	ACTIVITIES	MILESTONES	DURATION
Phase I Existing Data Review and Work Plan	<ul style="list-style-type: none"> Existing data review Develop plan for field work 	<ul style="list-style-type: none"> Work Plan for Field Activities 	Weeks of Sept. 30, 2002 to Nov. 18, 2002 (8 weeks)
Phase II Field Activities	<ul style="list-style-type: none"> Mobilize Field work (well installation and initial sampling of Lake One materials and groundwater) Demobilize Laboratory analysis Second round groundwater sampling Laboratory analysis Data reduction 	<ul style="list-style-type: none"> Included in Phase IV submittal Meeting(s)/conference call(s) 	Weeks of Dec 2, 2002 to February 3, 2003 for initial field work (10 weeks) Weeks of March 10, 2003 to April 14, 2003 for follow-up sampling (6 weeks)
Phase III Alternative Evaluation	<ul style="list-style-type: none"> Alternatives development Quantity/cost estimation Alternatives evaluation Alternative selection 		Weeks of Feb. 10, 2003 to July 28, 2003 (22 weeks)
Phase IV Feasibility Report	<ul style="list-style-type: none"> Data presentation Updated conceptual model Alternative summary 	<ul style="list-style-type: none"> Feasibility Report 	Weeks of August 4, 2003 to Sept 22, 2003 (8 weeks)